Researchers find unique regulatory pattern that promotes essential cell function

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Scientists and clinicians often encounter road blocks in designing specific treatments for diseases like cancer or developmental disorders because proteins that regulate cell functions through complex mechanisms are misunderstood.

A researcher at the University of Tennessee, Knoxville, has discovered a novel aspect of a fundamental cellular process that could be a key to overcoming that barrier.

Maitreyi Das, an assistant professor in UT's Department of Biochemistry and Cellular and Molecular Biology, found that during cytokinesis—the final stage of cell division when the cell physically separates into two—a signaling protein known as Cdc42 is activated and triggers a series of processes within the cell.

Defects in the control of Cdc42 have been associated with cancer. Scientists have speculated that Cdc42 plays a role in final cell division but didn't know how until now. Das discovered that Cdc42 is activated in a unique pattern to regulate the cytokinesis process.

"The signaling protein acts like an internal clock that allows events to happen in the right order," she said.

The findings were recently published as a highlighted article in the journal *Molecular Biology of the Cell*.

Das, along with UT postdoctoral student Bin Wei and graduate student Brian Hercyk, studied the cell process using a model of fission yeast. The simple model provides scientists with a paradigm for similar studies in more complex organisms, she said.

"The findings advance our knowledge of a basic biological process," Das said.

To treat diseases such as cancer, researchers need to understand how a cancer cell behaves and what defects in that cell lead to the disease. Cell processes do not occur in an isolated way, Das said. Rather, they're connected to each other as part of a system.

"Understanding how something functions under normal conditions is the first step towards understanding the defects that lead to disease and designing a treatment for it," Das said. "Until we do that, we don't have a way to understand cancer and other diseases."

Provided by University of Tennessee at Knoxville